

with the naked eye in the vessel immersed in the block M. By projecting them with a lens they are increased about 200 times, and it is even possible to see by transparence the state of their organs." In the experiment represented in Fig. 1, one of the operators is occupied in regulating the electric lamp and in setting the microscope of projection, while the other commences to apply the pressure. The animalculæ projected on the screen are the *Cyclops*, small crustaceans which are met with at this time of the year in brooks, and which are scarcely a millimetre in length. These are so enlarged, and appear with such transparency, that we can follow on the screen the movements of their branchia, and even of their heart, during the experiment. Dr. Regnard is pursuing at present his

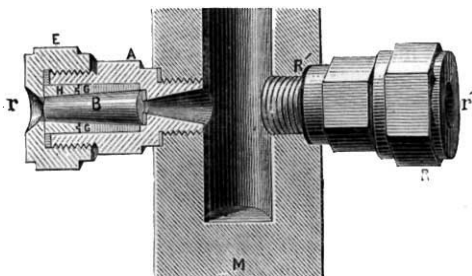


FIG. 1.—Details of apparatus in Fig. 1.

studies into life under high pressures. He showed last year that the unequal compressibility of the liquids and solids which form the organism caused the latter after a long pressure, to be soaked with water, become turgid, and consequently lose their functions. But, with the apparatus here described, he has been able to follow the phenomena which precede this. From the pressure at 1000 metres (about 200 atmospheres) the object shows inquietude, at 2000 metres it falls to the bottom of the vessel struggling; towards 4000 it remains inert and benumbed. When its normal pressure returns it recommences moving, unless the pressure has been long and its tissues are not soaked. This seems to show that the effect is a compression of the nervous system.

NOTES

WE understand that Mr. Francis Galton has already obtained valuable results from the Family Records sent him last year in response to his offer of prizes, and that he purposes to make much use of them in his Presidential address to the Anthropological Section of the British Association at Aberdeen.

WE have already intimated that Prof. Bonney has decided to retire from the Secretaryship of the Association after the Aberdeen meeting. We understand that Mr. A. T. Atchison will be proposed as his successor.

MANY interesting excursions have been arranged by the Local Committee of the Aberdeen meeting of the Association. One of them will, of course, be to the great granite quarries in the neighbourhood of Aberdeen. Her Majesty has invited 150 of the members to Balmoral, where they will be shown over the grounds and have lunch. It is not to be expected that the Queen will personally receive all the members, though it is possible that a few representative men of science may be presented to Her Majesty. Other excursions will be to Haddo House, Dunecht, Dunnottar, Drum and Crathes, Loch Kinerd, on the Saturday; while on the Wednesday and Thursday of the second week parties will be taken to Braemar, Invercauld, Haddo House, Huntly Castle, Elgin, Banff, Portsoy, and other places. The efforts which the Local Committee are making to render the meeting a success are all that could be

desired. It is only to be hoped that they may succeed in persuading the Aberdeen hotel and lodging-house keepers to reduce their exorbitant charges. The arrangements for important discussions in Sections A and B we have already referred to.

IN connection with the meeting we venture to recommend to our readers the new edition of Baddeley's "Guide to Scotland," Part 1, a copy of which has been sent us. It includes all the country from the Borders to as far north as Aberdeen, Inverness, Gairloch, and Stornoway. No more useful, practical, and trustworthy guide to the region exists, while the thirty-seven admirably executed maps and plans will be found a great comfort and convenience. Dulau and Co. are the publishers.

M. JANSSEN will shortly begin a new series of experiments on the influence of gases in spectrum analysis, in continuation of those which he made about fifteen years ago at La Villette gasworks. The tubes in which the gas will be contained and compressed will have a length of more than 100 metres, and be able to bear an unusual amount of pressure. Thus a new degree of accuracy may be expected from these researches, which are progressing favourably at the Meudon Physical Observatory.

FOR more than a year some important measurements of the altitude and movements of clouds have been carried on at Upsala by the aid of two theodolites, one of which is mounted in the Linnæus and the other in the Botanical Gardens. These instruments, which belong to the Academy of Science, were used for auroral and cloud measurements by the Swedish expedition to Spitzbergen, 1882-83. The object of the measurements of the altitude and movements of clouds is not so much to obtain their mean altitude as to derive some knowledge of their movements in the upper part of the atmosphere, a matter which is of great importance to meteorology. The researches have advanced so far that it has been found possible to fix astronomically the movements and altitude of the cirrus clouds.

ACCORDING to the *Tägliche Rundschau* the population of Ratisbon has been greatly frightened by the sudden disappearance recently of thousands of jackdaws, which dwelt in the spire of the cathedral of the town, on account of a similar phenomenon occurring before the outbreak of the last cholera epidemic in the place. In Munich a similar phenomenon is also stated to have taken place.

REFERRING to "sonorous sand," the report of the secretary of the Smithsonian Institution says that an interesting problem to physicists and geologists has been the sand found in certain localities, which, when placed in motion by sliding, sometimes produces a very sonorous or resonant sound, peculiar in character and difficult of explanation. Prof. Bolton, of Trinity College, Hartford, desirous of making researches on the subject, and especially of studying the microscopical, chemical, and physical peculiarities of the grains, requested the aid of the Institution in obtaining materials for the purpose. A considerable variety of specimens was collected in the Sandwich Islands, the coast of Oregon, Germany, and many other places. These are now in Prof. Bolton's hands, and he will prepare a report on the subject.

THE Chesapeake Zoological Laboratory, as the marine station maintained by the Johns Hopkins University is designated, is *Science* states, established for the present summer session at Beaufort, on the coast of North Carolina. Dr. W. K. Brooks, the director, who was prevented last year by ill-health from giving as much time as usual to the laboratory, is fortunately quite restored to his usual strength, and is in full activity at his post. Twelve collaborators are with him. Several of these are already teachers in various branches of zoological science, and all of them are well prepared to make use of the opportunities

which are afforded at this station. An unusual number are engaged in original researches. The season of 1885, although uncomfortably hot, has thus far been exceptionally favourable for collection. The weather has been calmer than heretofore in June and July, and specimens were found in June which have usually not appeared until the middle of August. The company, notwithstanding their personal discomfort from the heat, have maintained their full enthusiasm in the work upon which they are engaged; and it now appears as if the eighth session of the laboratory would be more fruitful in results than its predecessors, good as they have been.

A DUNFERMLINE correspondent writes to us that one of the most important and certainly the most complete cemetery of the Stone Age which has been laid bare in recent times has just been discovered in the grounds of Pitreavie, Dunfermline, Fifeshire. In connection with rebuilding operations a sand-pit was opened, and here, in a space of 15 yards by 10 yards, no fewer than five cists have been discovered. The cists were constructed of rough sandstone flags, and four of these measured about 42 inches in length, 20 inches in breadth, and 16 inches in depth. The fifth was little more than 18 inches square. A cinerary urn of baked clay was found in each of the large cists, but in the small "grove" nothing was found but a quantity of apparently calcined bones. A couple of flint scrapers and a bottle-shaped piece of limestone—which may have done duty as a hammer—were also among the finds. The urns measure from 5 to 6 inches across the mouth and from 4½ to 6 inches in height, and, strange to say, the construction of the bowls indicate that they have been made at different successive periods. No. 1 urn is an unshapely piece of sun-dried pottery; No. 2 showed an advance in the shape; and Nos. 3 and 4 are neatly formed and ornamented with a simple dotted pattern. The explorations will be continued, and it is expected that several other important finds will be made. Dr. Munro, the author of "Ancient Scottish Lake Dwellings," has visited the tumuli with a view to place a report in the hands of the Antiquarian Society of Scotland. A tradition exists that the site of the mound was an old graveyard, and some people who have been engaged in the district in agricultural pursuits for the past half a century state that numerous flagstones and pieces of urns have been turned up by the plough or grubbed, and Dr. Munro attaches great importance to the flint scrapers, and was of opinion that the bones found in the small cist were human bones.

At the recent Railway Congress at Brussels the question whether it would be economical and desirable to use iron or steel instead of wooden sleepers was fully discussed. It was stated that metal sleepers of various patterns are being used in Holland and India to a considerable extent, and that they are being tried experimentally in Belgium, England, and other countries. An opinion was expressed that sleepers of the description which is being tried in England would afford good material support for the rails on main lines, although some inconvenience might be felt from a quoin of wood being used with it. It was also considered that other metal sleepers which are being tried in Holland and elsewhere had given satisfactory results. The cost of metal sleepers is higher than that of wood. They require good ballast, and there had not been sufficient experience from their use, in regard to their duration and maintenance, to enable the section to state specifically the relative advantages of the new description of sleepers. It was therefore considered that further experience is necessary. The difficulty of arriving at a conclusion as to what would be applicable in all countries and under all circumstances was exemplified in the discussion of this subject by the representative of the Egyptian railways. He stated that iron or steel sleepers cannot be economically used in Egypt, because they become corroded by

the sand. The representative of the Indian railways, on the other hand, informed the section that iron or steel sleepers only can be used in India, because the white ant destroys wooden sleepers. Considerable discussion took place as to the construction of railways in regard to the curves, gradients, and works generally, including the question whether lines with a comparatively small traffic should be laid with heavy or light rails. It was, however, found impossible to lay down any general propositions which could be adopted under all the circumstances in which railways have to be made.

It may be remarked that François Arago was born at Estagel in the beginning of February, 1786, so that a centennial celebration may be expected next year. A statue was erected in this place twenty-nine years ago at the expense of the late M. Percire.

AN exhibition of labour was opened a few weeks ago at the Palais de l'Industrie, Paris. An electrical railway with a single rail was exhibited by M. Lartigue, and is carrying passengers with regularity on a zigzag line of about 200 metres' length. A series of popular exhibitions with magic lanterns on the new features of microscopy is largely attracting public attention. So-called antediluvian music is played on a series of irregular stones which have been selected so that they represent two octaves when suspended by strings.

THE American Ornithologists' Union will hold its next meeting in New York on Tuesday, November 17.

WE have received catalogues of electrical apparatus from two new firms: the first of these is the Kinetic Engineering Company, who are agents in this country for the well-known firm of Breguet. They are now exhibiting Lippmann's ingenious mercurial galvanometer. The second catalogue is that of Messrs. P. Jolin and Co., of Bristol. This enterprising firm describes several instruments of great use in the physical laboratory, especially the dead-beat galvanometer of D'Arsonval's type, and adjuncts therefore. This instrument appears to be specially adapted for private laboratories. We are glad to see new firms taking such good standing in the character of the apparatus they offer to the scientific world.

THE Java newspapers report that volcanic activity in the island continues to increase. Another mountain, called Raun, broke out on June 21, casting out much steam and ashes. In the evening smoke was ejected in such quantities as to darken the horizon on the windward side, until a shower of ashes fell, upon which the sky cleared up. Raun appears to be an active volcano, but no such violent eruption has been known in recent years. On the night of July 8 a new eruption of Mount Smeru took place; it was a heavy explosion followed by a stream of red-hot lava, which came down to the same spot which was laid waste by the former eruption. In the evening of July 9 another explosion followed.

"RESULTS of Twenty Years' Observations on Botany, Entomology, Ornithology, and Meteorology, taken at Marlborough College, 1865-84," is the title of a large pamphlet embracing a summary of twenty years' work. The tables are accumulations of facts properly registered. In the botanical notices the first appearances in each year are given, the day being noted as the day of the *year*, not of the month. This method is readiest for comparison and for striking the average. In addition the average for the twenty years, the earliest and latest days, the amplitude and the number of observations are given. The entomological notices are arranged in the same way, except that the earliest and latest appearances and the amplitude are omitted; these are not a great loss, for they can be ascertained from the tables in a moment by any reader. In ornithology the observations include the date when first seen, and when an egg and the young have

been found. The meteorological notices include for each month of each year the highest, lowest, and mean readings of the barometer, the maximum and minimum temperature in the shade, the number of times the thermometer stood above certain points varying with the seasons of the year, the maximum in the sun, the minimum on the grass, amount of rain collected, and the number of rainy days. The wettest year of the twenty was 1882, when the rainfall was 43.79 inches; the driest, 1870, with 23.41 inches. The weather records in these tables have been kept by one observer, with properly verified instruments, and all the observations have been critically examined at the Royal Meteorological Society; the botanical notices, though obtained by a large staff of observers, have all been recorded by one person, who saw all the specimens; but entomological and ornithological notes were taken by a series of recorders, and there is therefore not the same uniformity as in the two previous cases.

We have received the annual report of the West Kent Natural History, Microscopical, and Photographic Society for the past year. It contains abstracts of several papers read during the year. It is a pity there is no abstract of the discussion introduced by the president at the annual dinner at Gravesend, on "Bacon and Beans." There are two papers on subjects connected with photography.

MR. W. F. STANLEY has recently brought out a new form of protractor and goniometer, which has the special merit of measuring an angle right up to the vertex. This new form of protractor will be very convenient to civil engineers in measuring angles upon ordnance maps which are most frequently subtended by short lines, and many other cases. Used as a goniometer, it will be very convenient to measure the angles of large crystals and planes of cleavage, also to draw the same direct from the instrument. The instrument consists of two concentric circles, the outer one carrying the graduation, the inner a Vernier; each supports an arm with an edge extending to the centre. The angles are measured by slipping the inner circle with its attached arm and Vernier round the groove on the outer circle, which keeps it in position. We believe the instrument has all the good points which Mr. Stanley claims for it, and it will be useful to artists as well in determining angles of perspective.

THE whitefish (*Coregonus albus*) now in the ponds at the Delaford Fishery are growing rapidly, some of them reaching seven inches in length. It will be remembered that the ova of these fish were brought from America last spring, and hatched out at South Kensington.

A REMNANT of the great forests which once covered the south of Sweden was recently dug out of a bog at Kiuneved, consisting of a boat 6 feet in diameter hollowed out of a log. The tree from which it was obtained must have been 20 feet in circumference. The wood, which was blue in colour, was very hard, and the boat so heavy that two bullocks could not move it.

MR. HENRY PHILLIPS, jun, one of the secretaries to the American Philosophical Society, has performed a very useful work in compiling a register of all the papers published in the *Transactions and Proceedings* of the Society since its commencement. The "register" forms a small pamphlet of fifty-six pages, the titles being arranged according to the authors' names. It is therefore an index to all the publications of the Society—but a name, not a subject, index.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus rhesus* ♂) from India, presented by Mr. E. Pelditch; a Bosmani Potto (*Pterodicticus potto* ♂) from West Africa, presented by Mr. C. R. Williams; two Gerbilles (*Gerbillus* —) from Suakim, presented by Surgeon-Major J. A. Shaw; two White-faced Tree

Ducks (*Dendrocygna viduata*) from West Africa, presented by Mr. Cecil Dudley; three Green Turtles (*Chelone viridis*) from the West Indies, presented by M. C. Angel, F.Z.S.; a Bonnet Monkey (*Macacus sinicus* ♀) from India, presented by Mr. J. C. O'Halloran; two Narrow-barred Finches (*Munia nisia*) from Java, an Indian Silver Bill (*Munia malabarica*) from India, an Amaduvade Finch (*Estrela amandava*) from India, presented by Mr. Horace Sanders; a Short-toed Eagle (*Circus gallicus*) from Southern Europe, presented by Mr. Henry Sotheman; a Mona Monkey (*Cercopithecus mona* ♂) from West Africa, presented by Mr. White; a White-necked Crow (*Corvus scapularis*) from West Africa, deposited; nine Gold Pheasants (*Thaumalea picta*), received from the Right Hon. George Selater-Booth, M.P.; a Barred-shouldered Dove (*Geopelia humeralis*), a Coquerel's Lemur (*Chirolagus coquereli*), a Collared Fruit Bat (*Cynonycteris collaris*), bred in the Gardens.

OUR ASTRONOMICAL COLUMN

THE BINARY-STAR 70 OPHIUCHI.—Notwithstanding the care with which the orbit of this double-star has been discussed, the companion appears to be again deviating from its predicted position to a considerable extent. It will be remembered that from the anomalous motion of the smaller star Madler was led to the suspicion that the law of gravitation does not apply in this system, while Jacob thought there was indication of disturbance from a third body.

M. Perrotin gives the following epoch resulting from his measures made at Nice in 1883:

1883.49 ... Position 45° 6' ... Distance 2".28

On comparing with the orbit assigned in No. 1 of "Astronomical Observations made at the University Observatory, Oxford," which accords closely with the measures up to 1878, and with the orbits Flammarion, Tisserand, and Schur, we find the following differences taken in the order, observation—calculation:—

	Position.	Distance.
The Oxford orbit	- 9°.9	- 0".60
Flammarion	- 12°.8	- 0".18
Tisserand	- 13°.5	- 0".57
Schur	- 17°.4	- 0".73

It is very possible that in this case the difficulty of representing the position of the companion-star may be attributed to the paucity of measures near the peri-astron, rather than to an anomalous motion which has not been remarked in most of the other binaries. However this may be, the object no doubt is one deserving of continued attention. The Oxford orbit, which, it will be seen, is the nearest as regards the position angle in 1883, gives for 1885.5—position, 44°.6; distance, 2".64.

TUTTLE'S COMET.—On September 10, at midnight, this comet will be in about R.A. 136° 33', Decl. +3° 48', rising at Greenwich two hours before the sun, and with an intensity of light one-third greater than when first observed at Nice on August 8. It may perhaps be observed after perihelion in the southern hemisphere if the more powerful telescopes are utilised. On August 13 the correction to Herr Raht's ephemeris was -13s. in right ascension and +5'.5 in declination. The comet is about 2' in diameter, without very apparent central condensation.

THE COMET OF 1652.—At present we have only one calculation of the orbit of this comet—that of Halley, founded upon the observations of Hevelius in the scarce volume of the "Machina Cœlestis." It would be interesting to investigate the orbit anew from the observations made by Richard White at Rome, though he gives no nearer time for his distances of the comet from stars between December 21, 1652, and January 3, 1652, than "hora 2 post occasum solis." The observations will be found in *Zeitschrift für Astronomie*, vol. iv., where they are entitled "Observationes Cometæ, qui exente anno 1652 comparuit, habitæ Romæ per Riccardum Albium, Anglum." Zach supposed the observer to be Richard White, and there can be little doubt that he is the Mr. White repeatedly mentioned by Evelyn in his Diary. Zach has the remark, "Diese Beobachtungen können leicht besser als die des Hevelius seyn," and an examination of the latter will show that there is some foundation